

# Multigene Drought Tolerance Cassette for Crop Transformation

A combination of genes are expressed in concert by a single inducible promoter to produce a drought tolerance phenotype in crops

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Please note, header image is purely illustrative. Source: Linnaea Mallette, publicdomainpictures, CCO

## Background

About 70% of worldwide reduction in crop productivity is due to abiotic stresses which include drought, salinity, cold and extreme temperatures. These stresses, particularly drought as a result of climate change, cause extensive losses. For farmers, the effect of climate change is simply that the weather has become far more unpredictable, and extreme weather has become far more common, so drought tolerant crops are desirable.

## Technology Overview

A combination of genes are expressed in concert by a single inducible promoter to produce a drought tolerance phenotype in crops. The individual genes and promoter are derived from a resurrection plant with each individual gene linked to the precursor by a small gene sequence. The gene cassette in plants confers tolerance to drought as well as a positive side effect, i.e. faster maturation. The market for drought tolerant maize alone is estimated at \$2.7 billion per year.

Using a multi-gene approach, whereby a number of genes are arranged in tandem behind a single promoter makes it feasible to apply a polygenic (number of genes) approach to something as complex as drought tolerance where previously only single genes were applied. In such systems the specific combination and arrangement of the genes has an influence on the phenotype.

A drought stress inducible promoter is used, which circumvents the problem with constitutive promoters where the target protein is continuously produced, creating an unnecessary 'overhead' on an unstressed plant.

The technology incorporates a stress inducible promoter to drive expression of a multi-gene construct. This ensures that the transgenes are only expressed under stress conditions albeit relatively early (60-65% relative water content).

The technology applied in order to generate a multi-genic transcript is referred to as the 'foot and mouth virus 2A peptide system'.

## Further Details

Technology Readiness Level 6 - Prototype Demonstration

### Patents

- UK: GB 1609969.9

### IP Status

- Patent application submitted

### Seeking

- Commercial partner
- Licensing